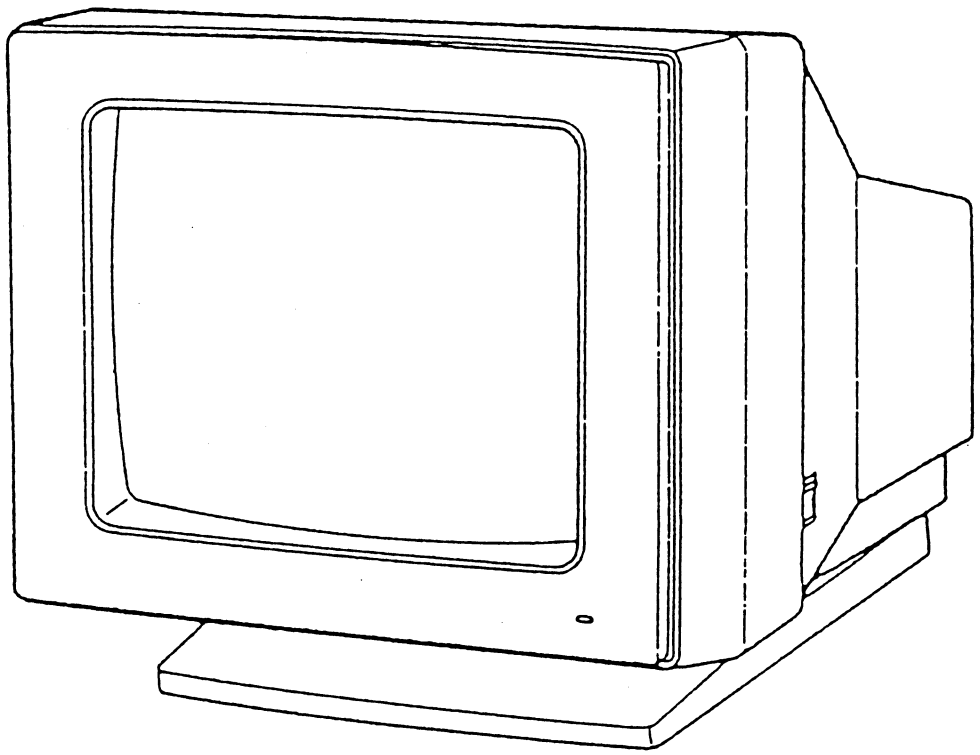
Kundendienst-Handbuch
Service Manual

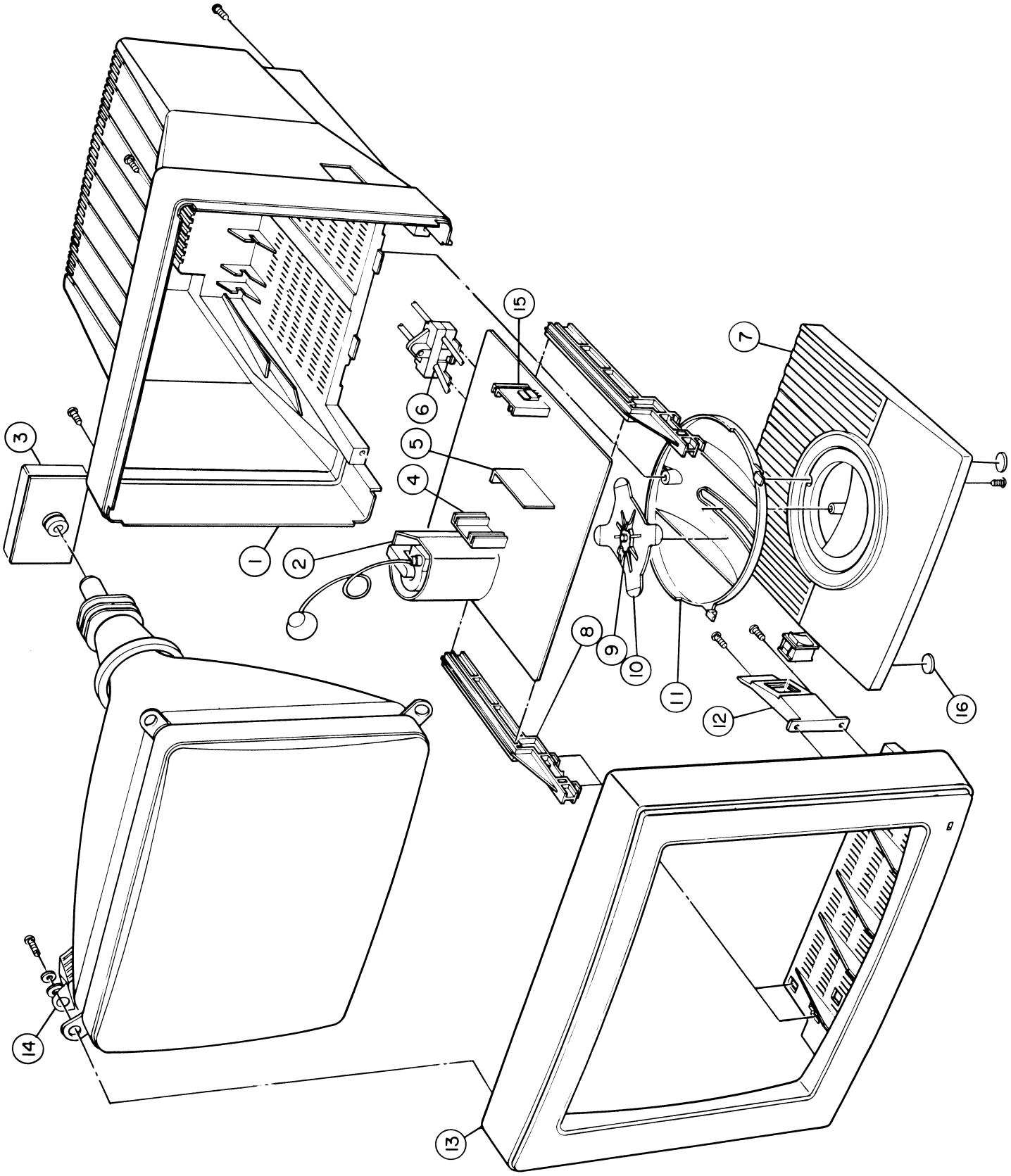
Schneider

MONOCHROM MONITOR
MM 12 (II)

Ident-Nr.: 43348



Exploded view



Specifications

1. CATHODE RAY TUBE
12″ diagonal, 90° deflection.
Phosphor : P39 (Yellowish Green), PMA (Amber Medium)
Face plate : Antiglare treatment

2. SIGNAL CONNECTOR
Input signals are applied through a 9 pin "D" connector.
The matching connector is a 9 pin "D" female connector.

2-1. VIDEO INPUT

Amplitude (Level Low)	: 0–0.5 V
Amplitude (Level High)	: 3.0–5.25 V
Signal Polarity	: Positive
Rise & Fall Time	: 10 ns max.

2-2. VERTICAL

Amplitude (Level Low)	: 0–0.5 V
Amplitude (Level High)	: 3.0–5.25 V
Signal Polarity	: Negative
Vert. Frequency	: 50 Hz

2-3. HORIZONTAL

Amplitude (Level Low)	: 0–0.5 V
Amplitude (Level High)	: 3.0–5.25 V
Signal Polarity	: Positive
Horiz. Frequency	: 18.44 kHz

2-4. VIDEO OUTPUT

Video Bandwidth	: 20 MHz min.

3. POWER : AC 220 V–240 V 50 Hz

4. DISPLAY AREA

4-1. Active Video Area	: 210 mm × 150 mm (8.27″ × 5.90″)
4-2. Display Format	
Character Block	: 9 × 14 dots
Character Matrix	: 7 × 9 dots
4-3. Display Character	: 25 rows × 80 columns

5. CENTERING

Horizontal	: ±4 mm (0.16″)
Vertical	: ±4 mm (0.16″)

6. GEOMETRY
See page 7.

7. LINEARITY

Adjacent character	: 7 %
Total character	: 7 %

8. RESOLUTION/FOCUS

Center	: 950 lines
Corner	: 750 lines

9. EXTERNAL CONTROLS
Brightness, Contrast, V-Size, V-Hold, Push-On (Power Switch)

10. ENVIRONMENT

Operating temperature	: +5 to +40 °C
Storage temperature	: −10° to +60 °C
Relative humidity	: 10 to 80 % (noncondensing)
Altitude	: 10,000 ft.

11. WEIGHT : 6.0 kg (13.2 lbs.)

12. DIMENSIONS : 310 (W) × 303 (D) × 282 (H) mm

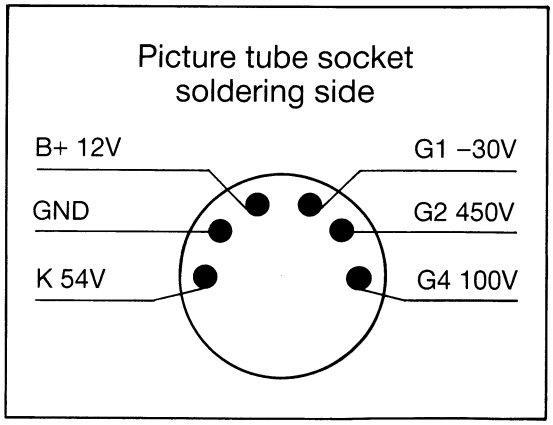
Ersatzteilliste für MM 12 (II)
Parts List for MM 12 (II)

Best.-Nr. Part.-No.	Bezeichnung	Description	Zeich.-Pos. Ref.-No.	Preisgruppe
48 265 00	Faltkarton	Gift box		B 7
48 266 00	Styropor, Satz	Poly foam, set		C 1
48 267 00	Rückwand	Cover	1	D 1
48 268 00	Halter, Kabel	Holder, cord	6	A 4
48 269 00	Gehäusefuß kompl.	Leg assembly	7, 9–11, 16	C 6
48 270 00	Halter, Platine	Holder, P.C.B.	8	A 3
48 271 00	Stütze, Netz	Support, power	12	A 3
48 272 00	Frontrahmen kompl.	Cabinet assembly	13	C 4
48 273 00	Bildröhre	C.R.T.		F 3
44 013 00	Netzkabel	Cord AC		C 5
48 274 00	Kabel, Signal kompl.	Cable, Signal assembly		D 0

Alignment Instructions & Voltage Chart

Alignment procedure	Adjustment
Contrast	VR 301
V-Hold	VR 601
V-Size	VR 602
V-Lin	VR 603
Focus	VR 701
Sub Bright	VR 702
Bright	VR 703
B + ADJ	VR 901

FBT/T 702		
	DC	AC
Pin 1	GND	GND
Pin 2	20 V	–
Pin 3	20 V	65 V
Pin 4	20 V	60 V
Pin 5	20 V	105 V
Pin 6	–	–
Pin 7	–	26 V
Pin 8	–	93 V



Voltage data
+/– 10 %

Pin Connector

Pin Nr.	Signal
1	GND
2	NC
3	NC
4	NC
5	NC
6	Intensity
7	Video
8	H. Sync.
9	V. Sync.

Circuit Description

POWER SUPPLY
The power supply is a SMPS (Switching Mode Power Supply) that consists of switching IC (IC901), SMPS transformer (T901), Switching transistor (Q901) and the associated components. The basic theory is the circuit of self oscillation. The primary winding of the SMPS transformer is applied the pluse by operating Q901. Therefore, rectified DC output voltage is obtained by the secondary winding of SMPS transformer T901.

VIDEO & INTENSITY
The monitor accepts the video and high intensity signals from the coaxially shielded connector. The video and high intensity is driven by IC301, which is a hex inverter, to the video amplifier stage.
The light character or background information shall be displayed in the character box oriented at two intensity levels. Low level reduces the brightness of white dots. The contrast ratio between low and high intensity should be at least 1:2, typically 1:3 over the whole brightness range.

VIDEO AMPLIFIER
Video amplification is provided by transistors Q303 and Q304. Transistors Q303 and Q304 are connected in a cascade configuration; Q303 operates as a common emitter and Q304 operates in the common base configuration. This minimizes the Miller effect input capacitance and the defining breakdown parameter for Q304 becomes V_{CBO} as opposed to V_{CEO} for the common emitter configuration. This enables selection of a higher speed/ lower breakdown transistor to be used in the video amplifier.
The video amplifier is nomally off. That is, in the absence of a video input signal or with a signal level of less than 0.6 V. Then the CRT cathode voltage will be at +55 V when the input signal exceeds 0.6 V. Then the amplifier begins operation in the linear region and the CRT cathode voltage starts to decrease with a nomal voltage gain of 40 V.

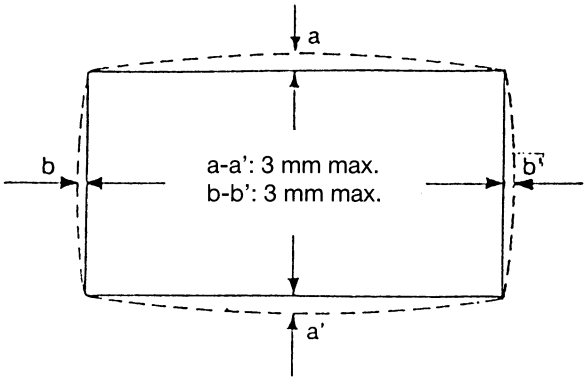
VERTICAL DEFLECTION
The vertical deflection circuit consists of an IC, TDA 1170D, and the vertical deflection coil of the deflection yoke (DY) and its associated circuitry. The IC (TDA 1170D) incorporates all the functions for providing the yoke of the monitor with the current required for the vertical deflection.
The preamplifier is a high input impedance differential type, with inverted input available. The noninverting input is fixed internally in the circuit at a stabilized voltage of approximately 2.2 V. During flyback, the flyback generator produces a voltage equal to approximately double the supply voltage, and this is applied at the yoke by means of the power amplifier. The oscillator is a threshold type with a high degree of frequency stability. It is synchronized with a circuit which receives either positive or negative sync pulses and ensures complete immunity from noise throughout most of the scanning time.

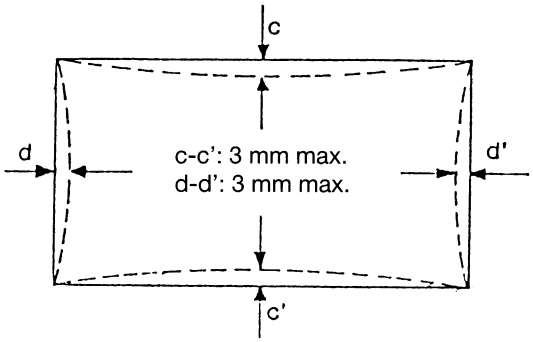
HORIZONTAL DEFLECTION
The horizontal deflection circuit consists of Q702 (driver), T701 (drive trans), Q703 (output TR) and the associated circuitry. The input trigger for this circuit is provided by the horizontal drive pulse. The pulse is injected into the base (for positive pulses) of Q702 through R701.
The horizontal drive pulse from Q702 is coupled through T701 to the base of horizontal output Q703. The B^+ for T701 is supplied from the 20 V line through R704.
The remainder of the horizontal circuit is straight forward. Width coil L703 and linearity coil L704 are in series with the DY (deflection yoke). An adjustable coil is provided for width. The linearity coil has a magnetically biased core which makes the inductance of the coil dependent uon its current. Pincushion and geometric corrections are made at the factory by the addition of permanent magnets around the plastic ring of the yoke.

POWER SUPPLY DESCRIPTIONS
This SMPS (Switching Mode Power Supply) using TDA4601 obtains rectified DC 20 V, 12 V from AC 220 V.
Power is supplied in the following procedure:
1. AC 220 V supplied from the AC socket is rectified by D901.
2. Rectified voltage is supplied to the T901.
   As to TDA4601, voltage which is primarily rectified by D901, is supplied to pin 9 of IC901 through R903.
3. At this moment, a pulse is generated at pin 7 of the IC, which switches Q901 by internal oscillation of IC901.
4. This oscillation causes Q901 to switched, and at the secondary terminal of T901, a voltage proportional to the turn ratio is generated.
5. The generated voltage supplies DC 20 V, 12 V to the output terminal after the rectified by D930, D931.
6. Between pins 5 and 6 of T901, a voltage is generated proportional to turn the ratio from voltage generated between pins 3 and 4.
7. Reference voltage (pin 1 of IC901) is obtained through D904 by sensing generated voltage.
8. Stable voltage is obtained by changing the internal oscillation integer.

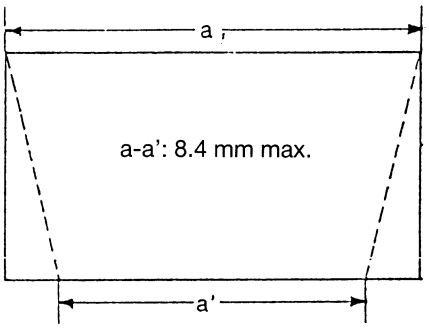
Geometry Measurements

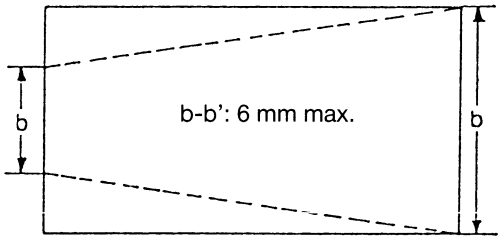
PINCUSHION AND BARRELLING



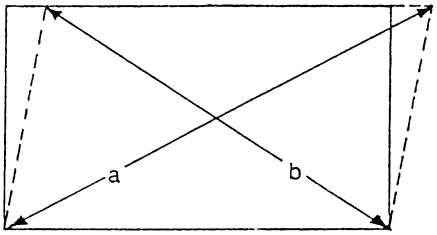


TRAPEZOID

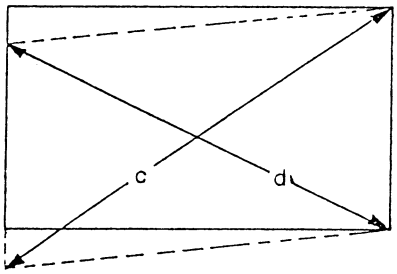




PARALLELOGRAM

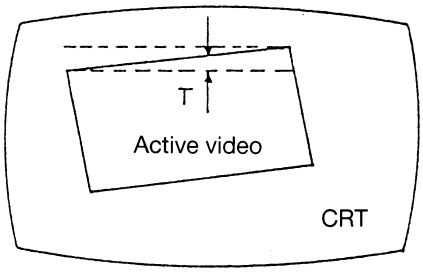


a-b: 5.2 mm max.



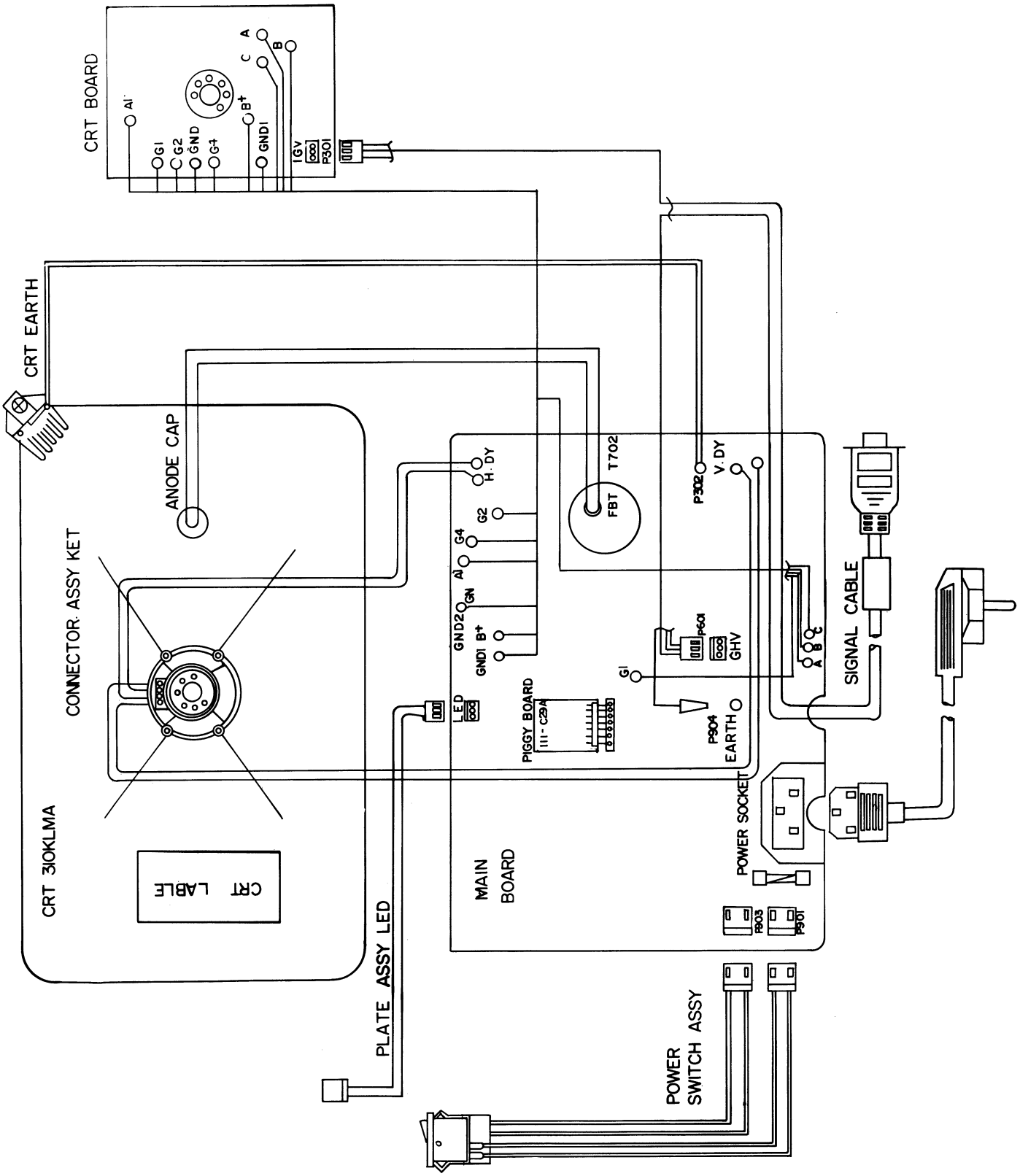
c-d: 5.2 mm max.

YORK TILT



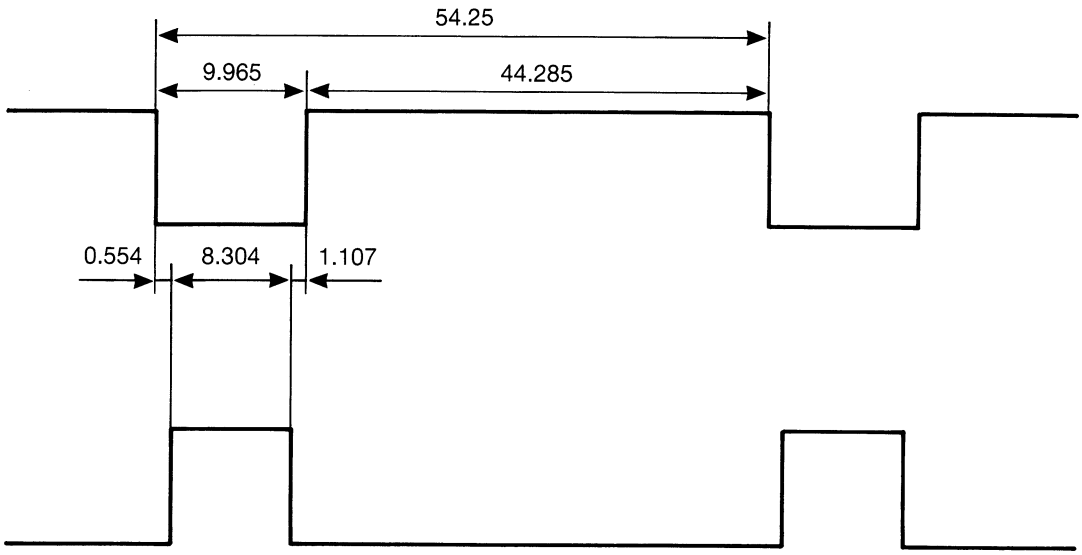
T = 3 mm

Wiring diagram

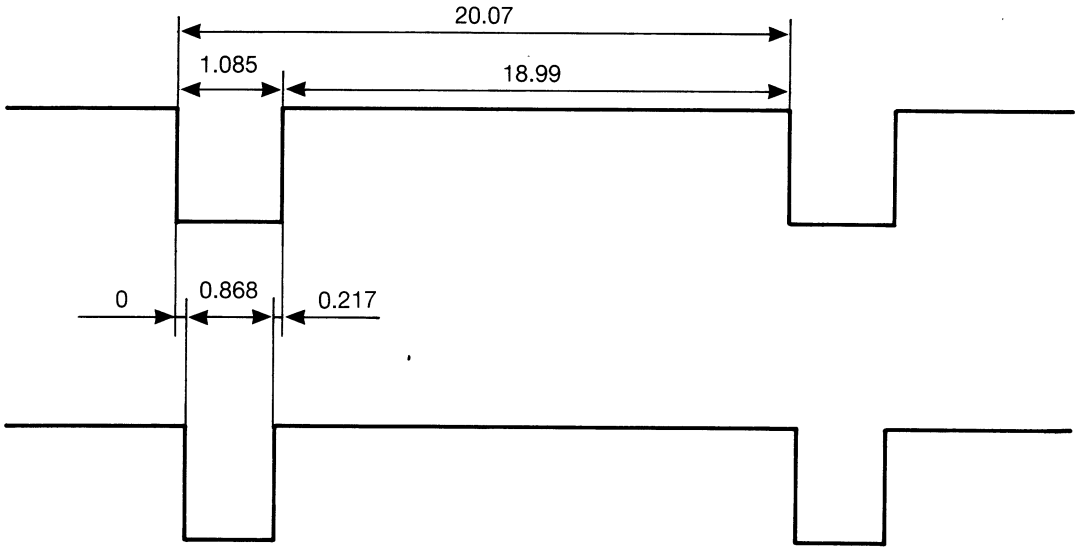


TIMING CHART

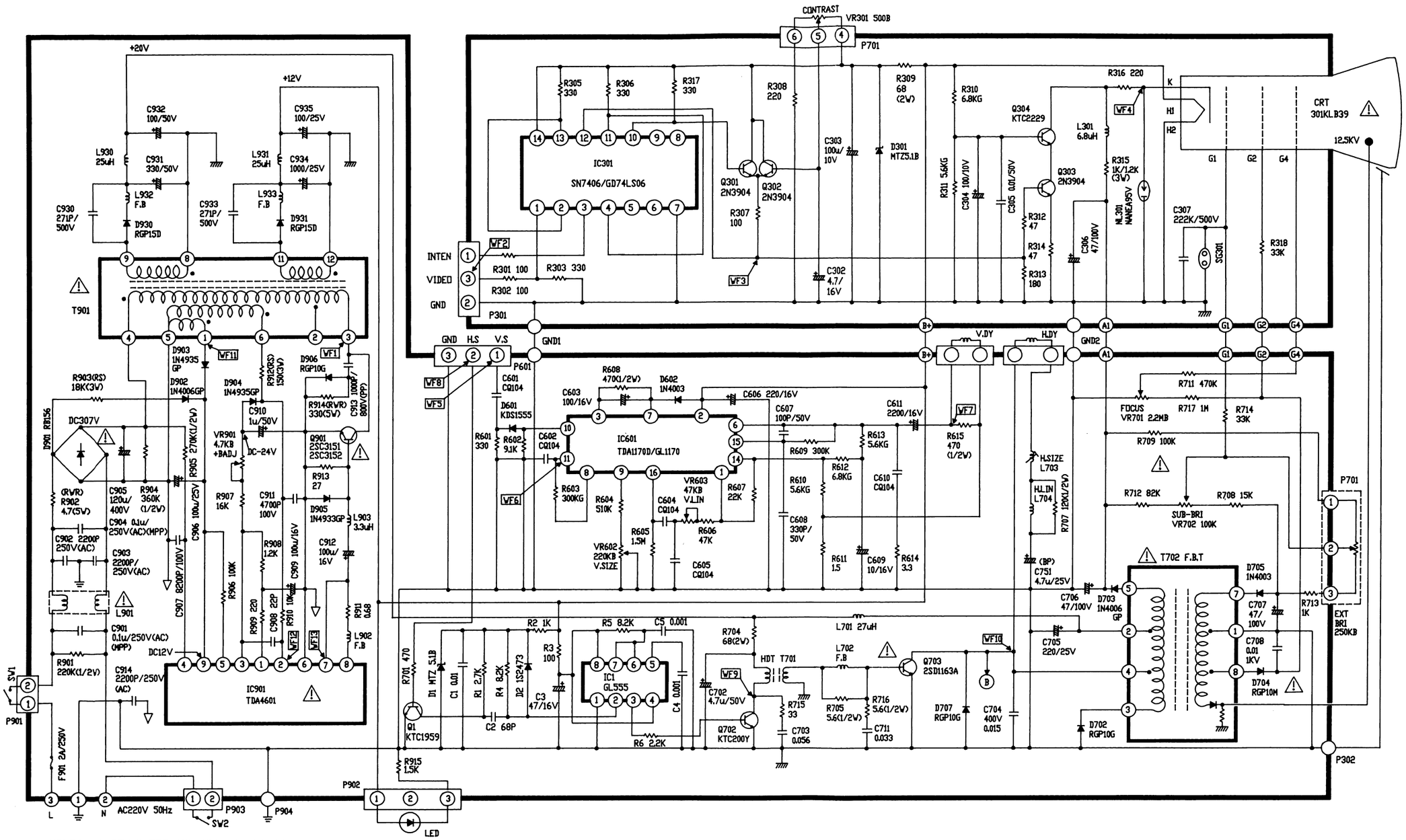
1. Horizontal Timing (unit; us)



2. Vertical Timing (unit; ms)



Schematic diagram



NOTES :
1. RESISTORS ARE SHOWN IN OHMS
   K= 1,000 M= 1,000,000
2. CAPACITORS ARE SHOWN IN uF
   OTHERWISE NOTED P = u u
3. ALL RESISTORS ARE ± 5 % TOLERANCE
   UNLESS OTHERWISE INDICATED
⚠ : REPLACE ALL COMPONENTS MARKED WITH SAFETY SYMBOL WITH IDENTICAL TYPE
4. ▭ DENOTES CONNECTOR ON THE BOARD
5. ⏚ (EARTH) ⏚ (1ST GND) ⏚ (2ND GND)

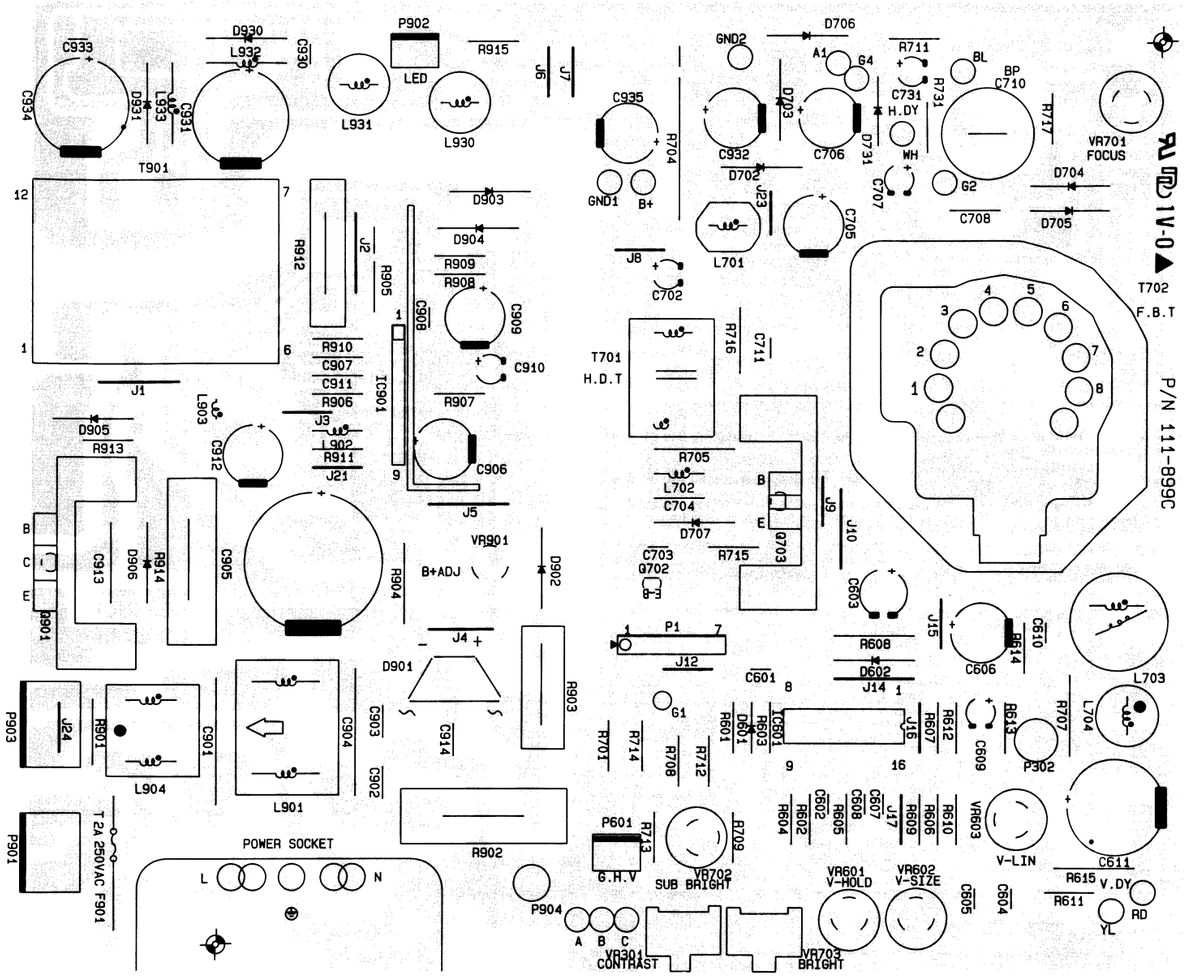
IMPORTANT SAFETY NOTICE

THE SHADED AREA ON THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS, WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS IN THE SHADED AREAS OF THE SCHEMATIC.

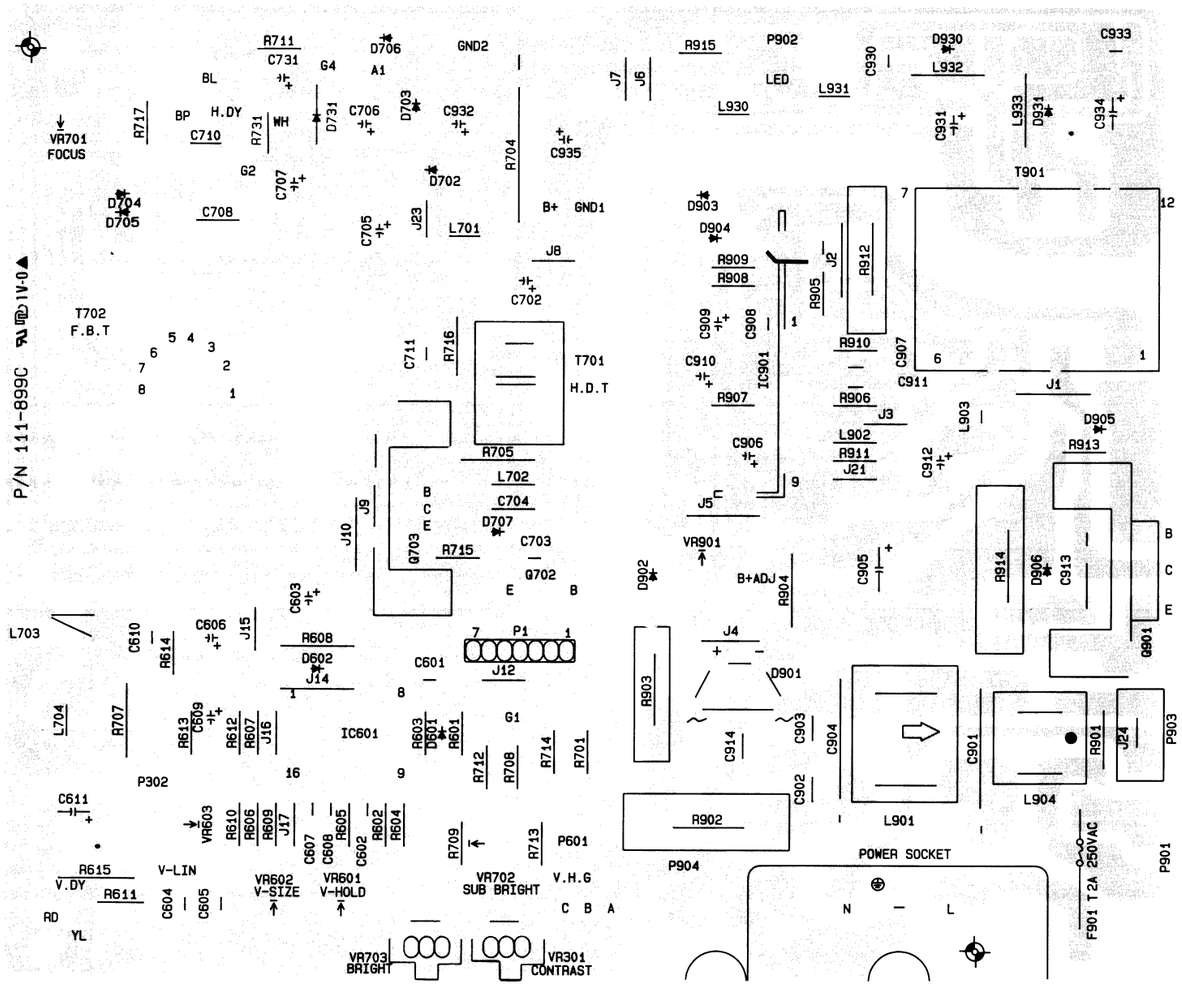
IMPORTANT AVIS SUR LA SECURITE

LA PARTIE OMBREE DE CE DIAGRAME SCHEMATIQUE COMPREND DIMPORTANTES CARACTERISTIQUES SPECIALES CONCUES POUR PROTEGER DES RAYONS X, ET DES DANGERS DINCENDIE ET DE SECOUSSES ELECTRIQUES. EN CAS DE BESOIN SI DES PIECES DE CETTE PARTIE OMBREE DOIVENT ETRE REMPLACE SN UTILISEZ QUE DES PIECES SPECIFEES PAR LE MANUFACTURIER.

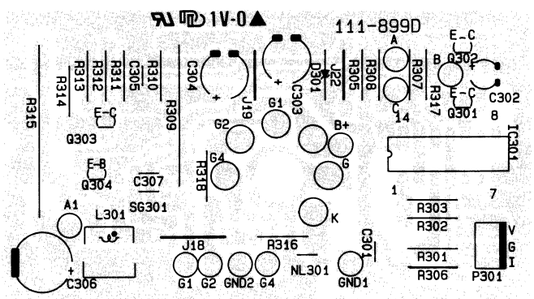
Main P.C.B.
Component side



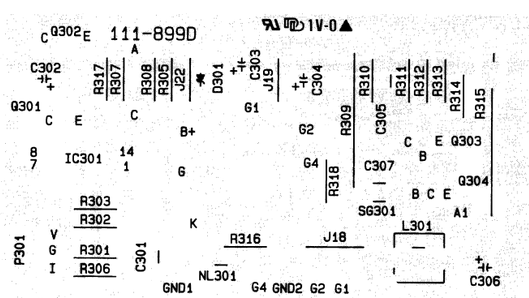
Main P.C.B.
Soldering side



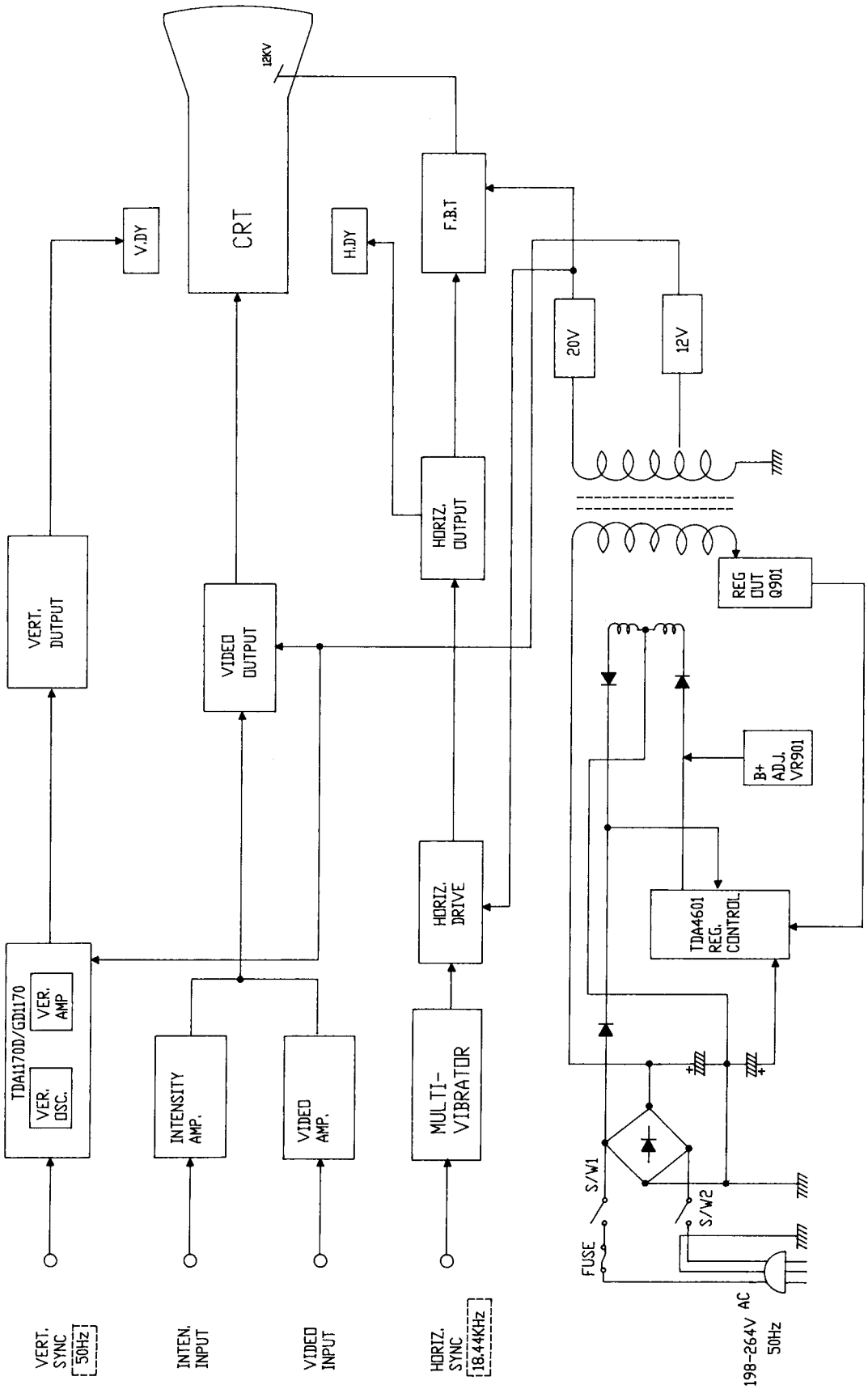
CRT P.C.B.
Component side



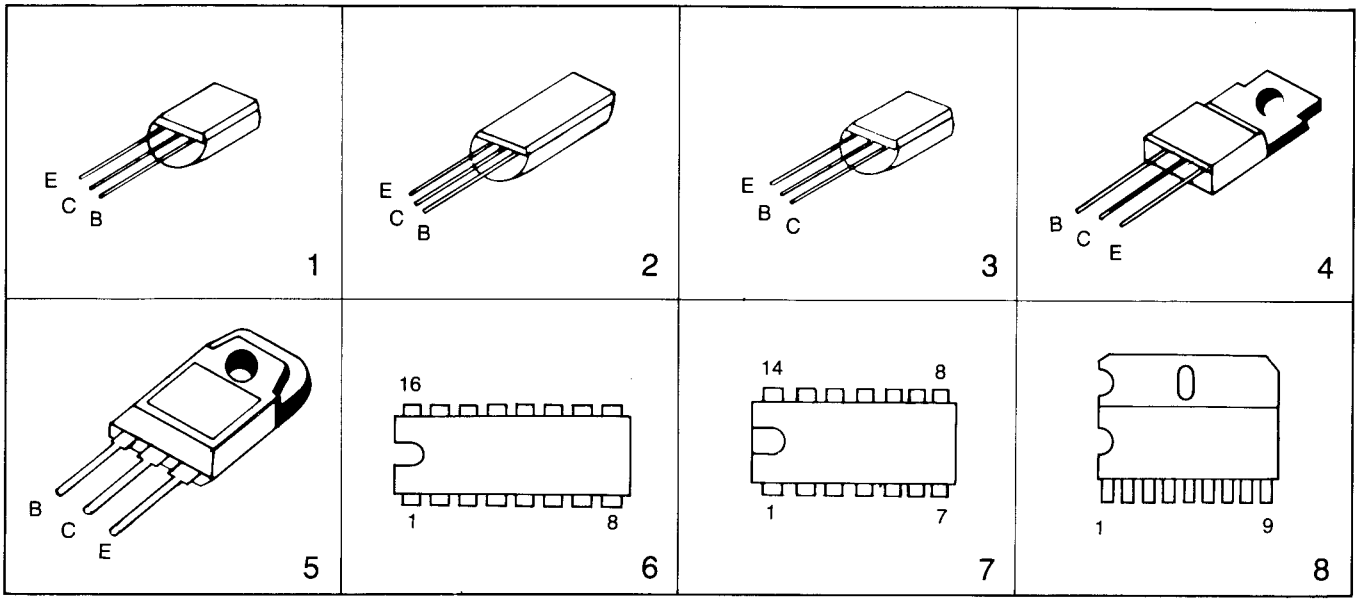
CRT P.C.B.
Soldering side



Block diagram



TRANSISTOR & IC BASING



TRANSISTOR TYPE BASE DIAGRAM	REF. NO.	IC TYPE BASE DIAGRAM	REF. NO.
KTC 200Y	1	2SC3151	5
KTC 2229Y	2	TDA 1170D	6
2N3904	3	SN 7406	7
2SD1163A	4	TDA4601	8

VOLTAGE CHART

REF. NO.	TR. TYPE	FUNCTION	CONDITION	BASE	EMITTER	COLLECTOR
Q301	2N3904	Video Drive	No Signal	2.83	4.25	6.07
			3 VDC Video Input	0.35	4.30	5.06
Q302	2N3904	Video Drive	No Signal	5.07	4.31	5.08
			3 VDC Video Input	5.06	4.30	5.06
Q303	2N3904	Video Amplifier	No Signal	0.37	0	5.13
			3 VDC Video Input	0.58	0.20	4.94
Q304	KTC2229	Video Output	No Signal	5.53	5.13	55.5
			3 VDC Video Input	5.30	4.94	53.6
Q702	KTC200	Horizontal Output	No Signal	−0.03	0	28
			3 VDC Video Input	0.26	0	13.29
Q703	2SD1163A	Horizontal Output	No Signal	0	0	28
			3 VDC Video Input	0.01	0	19.8
Q901	2SC3151	SMPS Output	No Signal	−0.04	0	310
			3 VDC Video Input	0.24	0	307

VOLTAGE CHART

REF. NO.	IC. TYPE	FUNCTION	IC. PIN	CONDITION	VOLTAGE
IC301	SN7406	Video and Intensity Amplifier	1	No Signal	0.02
				3 VDC Video Input	0.39
			2	No Signal	5.07
				3 VDC Video Input	4.28
			3	No Signal	1.75
				3 VDC Video Input	0.59
			4	No Signal	0.22
				3 VDC Video Input	1.18
			5	No Signal	1.72
				3 VDC Video Input	1.73
			6	No Signal	0.12
				3 VDC Video Input	0.13
			7	No Signal	0
				3 VDC Video Input	0
			8	No Signal	0.13
				3 VDC Video Input	0.13
			9	No Signal	1.75
				3 VDC Video Input	1.73
			10	No Signal	3.61
				3 VDC Video Input	1.32
			11	No Signal	1.19
				3 VDC Video Input	4.27
			12	No Signal	0.38
				3 VDC Video Input	0.59
			13	No Signal	5.08
				3 VDC Video Input	4.77
			14	No Signal	5.08
				3 VDC Video Input	4.77
IC601	TDA1170D	Vertical Processor	1	No Signal	2.63
				3 VDC Video Input	2.38
			2	No Signal	12.33
				3 VDC Video Input	12.0
			3	No Signal	1.10
				3 VDC Video Input	1.05
			4	No Signal	0
				3 VDC Video Input	0
			5	No Signal	0
				3 VDC Video Input	0
			6	No Signal	6.43
				3 VDC Video Input	6.63
			7	No Signal	11.82
				3 VDC Video Input	11.53
			8	No Signal	6.62
				3 VDC Video Input	6.62
			9	No Signal	6.75
				3 VDC Video Input	6.76
			10	No Signal	0
				3 VDC Video Input	0
			11	No Signal	3.0
				3 VDC Video Input	2.63
			12	No Signal	0
				3 VDC Video Input	0
			13	No Signal	0
				3 VDC Video Input	0
			14	No Signal	2.11
				3 VDC Video Input	2.11
			15	No Signal	0.69
				3 VDC Video Input	0.69
			16	No Signal	1.76
				3 VDC Video Input	1.50
IC901	TDA4601	SMPS VOLTAGE CONTROL	1	No Signal	4.30
				3 VDC Video Input	4.30
			2	No Signal	0.18
				3 VDC Video Input	0.10
			3	No Signal	2.18
				3 VDC Video Input	2.19
			4	No Signal	2.15
				3 VDC Video Input	2.19
			5	No Signal	7.14
				3 VDC Video Input	7.15
			6	No Signal	0
				3 VDC Video Input	0
			7	No Signal	1.64
				3 VDC Video Input	1.70
			8	No Signal	1.65
				3 VDC Video Input	1.72
			9	No Signal	11.13
				3 VDC Video Input	11.19

Ersatzteilliste für MM 12 (II)
Parts List for MM 12 (II)

Best.-Nr. Part.-No.	Bezeichnung	Description	Zeich.-Pos. Ref.-No.	Preisgruppe
IC				
48 275 00	IC GL 555	IC GL 555	IC 1	A 5
32 166 00	IC 74 LS 06	IC 74 LS 06	IC 301	A 7
44 716 00	IC TDA 1170 D	IC TDA 1170 D	IC 601	B 6
38 120 00	IC TDA 4601	IC TDA 4601	IC 901	B 5
Transistoren/Transistors				
37 570 00	Transistor KTC 1959-0	Transistor KTC 1959-0	Q 1	A 2
45 083 00	Transistor 2 N 3904	Transistor 2 N 3904	Q 301-303	A 3
26 549 00	Transistor KTC 2229-Y	Transistor KTC 2229-Y	Q 304	A 5
46 526 00	Transistor KTC 200-Y	Transistor KTC 200-Y	Q 702	A 2
48 276 00	Transistor 2 SD 1163 A	Transistor 2 SD 1163 A	Q 703	B 4
48 277 00	Transistor 2 SC 3151	Transistor 2 SC 3151	Q 901	B 3
Dioden/Diodes				
48 278 00	Z-Diode MTZ 5,13	Z-Diode MTZ 5.13	D 1	A 1
24 654 00	Diode 1 S 2473	Diode 1 S 2473	D 2	A 2
48 279 00	Z-Diode Z 5,1	Z-Diode Z 5.1	D 301	A 2
21 752 00	Diode KDS 1555	Diode KDS 1555	D 601	A 3
11 240 00	Diode 1 N 4003	Diode 1 N 4003	D 602	A 2
44 846 00	Diode RGP 10 G	Diode RGP 10 G	D 702	A 9
44 721 00	Diode 1 N 4006	Diode 1 N 4006	D 703	A 3
26 619 00	Diode RGP 10	Diode RGP 10	D 704	A 5
11 240 00	Diode 1 N 4003	Diode 1 N 4003	D 705, 706	A 2
44 846 00	Diode RGP 10 G	Diode RGP 10 G	D 707	A 9
03 211 00	Diode 1 N 4004	Diode 1 N 4004	D 731	A 4
46 533 00	Diode RB-156	Diode RB-156	D 901	A 7
44 721 00	Diode 1 N 4006	Diode 1 N 4006	D 902	A 3
46 534 00	Diode 1 N 935 GP	Diode 1 N 935 GP	D 903, 904	A 2
46 535 00	Diode 1 N 933 GP	Diode 1 N 933 GP	D 905	A 2
44 846 00	Diode RGP 10 G	Diode RGP 10 G	D 906	A 9
44 852 00	Diode RGP 15 D	Diode RGP 15 D	D 930, 931	A 9
Widerstände/Resistors				
48 280 00	Widerstand 68/2 W	Resistor 68/2 W	R 309	A 1
37 930 00	Widerstand 1 K/3 W	Resistor 1 K/3 W	R 315	A 2
32 160 00	Widerstand 470/1 W	Resistor 470/1 W	R 608, 615	A 2
48 280 00	Widerstand 68/2 W	Resistor 68/2 W	R 704	A 1
44 723 00	Widerstand 120/½ W	Resistor 120/½ W	R 707	A 1
37 539 00	R-Zement 4,7/5 W	R-Cement 4.7/5 W	R 902	A 3
48 281 00	Widerstand 18 K/3 W	Resistor 18 K/3 W	R 903	A 3
48 282 00	Widerstand 150/3 W	Resistor 150/3 W	R 912	A 3
48 283 00	R-Zement 330/5 W	R-Cement 330/5 W	R 914	A 3

Ersatzteilliste für MM 12 (II)
Parts List for MM 12 (II)

Best.-Nr. Part.-No.	Bezeichnung	Description	Zeich.-Pos. Ref.-No.	Preisgruppe
Kondensatoren/Capacitors				
44 724 00	Foko 0,015 µF/400 V	PP 0.015 µF/400 V	C 704	A 5
34 961 00	Kerko 0,01 µF/1 kV	CK 0.01 µF/1 kV	C 708	A 5
48 284 00	Elko 120 mF/400 V	CE 120 mF/400 V	C 905	B 4
Spulen und Transformatoren/Coils and Transformers				
48 285 00	Spule 6,8 µH	Coil, PEAKING 6.8 µH	L 301	A 3
44 728 00	Spule 27 µH	Coil, CHOKE 27 µH	L 701	A 6
48 286 00	Spule	Coil, H. WIDTH	L 703	B 0
48 287 00	Spule	Coil, LINEARITY	L 704	A 6
48 288 00	Spule	Coil, LINE FILTER	L 901	B 2
46 552 00	Spule	Coil	L 903	A 2
48 289 00	Spule	Coil	L 930, 931	A 5
48 304 00	Trafo-Treiber	Transformer, drive	T 701	A 7
48 290 00	Zeilen-Trafo	F.B.T.	T 702	C 9
48 291 00	Netztrafo	Transformer power	T 901	C 7
Verschiedenes/Miscellaneous				
48 292 00	Hauptplatine	Main P.C.B.		F 5
48 293 00	Bildröhrenplatine	Picture tube P.C.B.		B 8
48 294 00	Drehregler KONTRAST	Resistor variable CONTRAST	VR 301	A 6
48 295 00	Trimmpoti V-HOLD	Resistor semifix V-HOLD	VR 601, 602	A 3
37 040 00	Trimmpoti 47 K	Resistor semifix 47 K	VR 603	A 4
48 296 00	Trimmpoti FOCUS	Resistor semifix FOCUS	VR 701	A 5
44 736 00	Trimmpoti SUB. BRIGHT	Resistor semifix SUB. BRIGHT	VR 702	A 4
48 297 00	Drehregler EXT. BRIGHT	Resistor variable EXT. BRIGHT	VR 703	A 5
37 026 00	Trimmpoti 4,7 K	Resistor semifix 4.7 K	VR 901	A 4
48 298 00	Netzschalter	Switch power		B 5
44 740 00	Glimmlampe 95 V	Neon lamp 95 V	NL 301	A 5
01 703 00	Sicherung 2 A	Fuse 2 A	F 901	A 1
44 741 00	Ablenkspule	DY		D 0
44 742 00	Funkenstrecke	Spark GAP	SG 301	A 5

Notizen
Note

Notizen
Note

Notizen
Note

********* ACHTUNG! *********

Für Daten aller Art, die sich bei Einsendung an die Firma Schneider, im Servicefall oder in jedem anderen Fall noch auf einem Datenträger befinden, wird bei Verlust oder Beschädigung keinerlei Haftung übernommen!
Bitte, sichern Sie sich Ihre Daten vorher von Ihrem Datenträger. Wie man eine Sicherungskopie erstellt, können Sie in Ihrer MS-DOS-Betriebsanleitung nachlesen.

********* IMPORTANT! *********

We accept no responsibility for the loss of or damage to data of any kind which is still contained on a data carrier which is sent to Schneider for servicing or for any other reason!
Please copy your data from your data carrier beforehand. You can read how to produce a backup copy in your MS-DOS operating instructions.

Bitte bei Ersatzteilbestellung die genaue Bezeichnung und **Ident-Nr. (siehe Typenschild)** des Gerätes sowie Bestell-Nummer und Positions-Nummer des Ersatzteils angeben.

For ordering of spare parts please state exact description and **ident no. of unit (see silver rating label on the backside of unit)** as well as part no. and position no. of required spare parts.

Benutzen Sie:

Telex: 531516

oder

*317298 #

oder

Telefax: 08245/51326

Technische Änderungen vorbehalten.
Technical modifications reserved.